Conexant Systems, Inc.

Audio Config Tool User Guide for CX2098x Rev 0.1

Introduction:

Conexant Systems, Inc. (Conexant) provides the "USB Audio Configuration Tool" to support the configuration and tuning of the CX2098x family of USB audio CODECs.

Starting:

Put the 'USB Audio Configuration Tool – 3.16.0.0.exe' in a folder on a Windows PC.

Plug in a USB cable between the CX2098x device and the host PC.

Open USB Audio Configuration Tool – 3.16.0.0 by clicking on the icon.

🕵 AudioCfgTool.exe

The follow GUI will open on screen.

You can change the Vendor ID, Device ID, UCQ String, Manufacturer, Product Name as well as Revision ID (numeric value). Terminal types can be configured by clicking on the selectable menu.

USB Audio Configuration Tool - 3.16.0.0	
File	Exit
Browse Load Save USB Audio Device Connected Status:	
Device Definitions Volume Settings Playback EQ Filter Settings Microphone EQ Filter Settings	
Device ID: 1405 Product Name: CONEXANT USB AUDIO	
Revision 0001 UCQ String: UCQ	
API Configuration Version: 0 USB Bus Power(mA): 100 Terminal Type Settings Playback Device 1 Recording Device 1 Playback Device 2 Recording Device 2	
Disable Disable Disable Speaker Microphone Headphone Microphone Array Communications Speaker Handset, Hand Held Headset, Head Mounted Headset, Head Mounted	

Figure 1: CX2098x Audio Config Tool --- Device Definitions

Click on the "Volume Settings" tab. The end user is free to change the volume steps of playback and recording.

USB Audio Config	uration Tool -	3.16.0.0	- 3	for Manager	1	1 8 0	X
File							Exit
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Device Definitions	lahuma Cattinga	Plauback EO Eilte	Settings Micropho	ne EO Eilter Settings	[
Device Deminions	Min (dB)	Max (dB)	Resolution (dB)	Default (dB)	l Balance Bar Control		
	-50	0	1	0			
Playback Device 1:					_		
Recording Device 1	: [-30	lo	1	l			
Playback Device 2:	0	0	0	0	Г		
Recording Device 2							
Sidetone:							

Figure 2: CX2098x Audio Config Tool --- Volume Settings

For the rest of this User Guide, we will focus on tuning the "Playback EQ Filter Settings" and "Microphone EQ Filter Settings"

Tuning the Playback EQ

Click on the "Playback EQ Filter Settings" tab.

Select the playback sample rate. In our case, we have a clip of 44.1k sample rate, therefore, we will use the 44.1k sample rate for our EQ.

USB Audio Config	juration Tool - 3.16.0.0	States of Laterage	1.2	
File Browse	Load Save	USB Audio Device Connected	Status:	Exit
Device Definitions Vo Adjust EQ 8k Sample 16k Sampl 32k Sampl	folume Settings Playback	EQ Filter Settings Microphone EQ Filter	Reset to Board EQ Coefficients	۹
- Biqu	Jud Settings			Maximum DAC Output (dB)
Q-F	Factor			5 -
Filt	ter Type Peaking Low Shelf High Shelf Low Pass High Pass	Peaking Peaking Low Shelf Low Shelf High Shelf High Shelf Low Pass Low Pass High Pass High Pass	Peaking Peaking Low Shelf Low Shelf High Shelf High Shelf Low Pass Low Pass High Pass High Pass	

Figure 3: Playback EQ tuning panel (un-activated)

Once desired sample rate has been selected, the "Biquad Settings" will be activated (not greyed out). See Figure 4 below.



Figure 4: Playback EQ tuning panel (activated)

Make desired changes by entering the Gain, Frequency, Q-Factor and the Filter Type (Peaking, Low Shelf, High Shelf, Low Pass, High Pass). See Figure 5 below as an example. Note that, the Max DAC Output on the right hand side can limit the max playback level. It ranges from a max of 5dB to a min of -74dB (very close to mute). While music or speech is being played, one can hear the effects of the EQ or max DAC output slider.

A "pop" noise can be heard during the adjustment of the tuning parameters, and is considered normal. Once the adjustments are made, no further pop noise should be heard through headphone playback.



Figure 5: Playback EQ tuning.

Tuning the microphone (recording path) EQ:

There are two panels on the mic tuning panel, namely: a. Microphone Gain Settings (see below)

-Microphone Gain Settings Mic Boost(dB)	27.00 30.00 33.00 36.00 ~
Mic Gain(dB)	0

Figure 6: Mic boost and mic gain.

b. Biquad Settings (See below)

-Biquad Settings -		
	Ţ	Ţ
Gain(dB)	0.0 •	0.0 •
Freq.	20	20
QFactor	0.00	0.00
Filter Type	Peaking Low Shelf High Shelf	Peaking Low Shelf Hinh Shelf

Figure 7: Mic Biquad cascade EQ.

The Mic Boost (in dB) can be adjusted in steps of 3dB. This is the analog boost of the microphone (amplified before the microphone ADC). Depending on the sensitivity of the microphone, Conexant recommends a boost in the range of 30 – 36dB. The Mic Gain (in dB) is a post analog-to-digital converter (ADC) digital gain that can be incremented / decremented in steps of 1dB. This allows gains to be fine tuned to compensate for the lack of fine granularity of mic boost. Since it is a digital gain, the signal along with noise, will be amplified by this gain.

Therefore, Conexant recommends that a suitable mic boost should be attained before tuning mic gain. A general guideline is, <= +/-3dB of mic gain be applied.

As for the mic EQ tuning, the CX2098x has a cascade bi-quad EQ for the microphone. Below is an example of a: 250Hz, Peaking filter, Q=0.707, 3dB Gain and 1200Hz, Peaking filter, Q=0.707, - 1dB Gain, in cascade.



Figure 8: Mic Biquad cascade EQ, tuned.

USB Audio Configuration Tool - 3.16.0.0	Carlos and	
File Browse Load Save USB Aud	lio Device Connected Status:	Exit
Device Definitions Volume Settings Playback EQ Filter Settings	Microphone EQ Filter Settings	1
Microphone Gain Settings Mic Boost(dB) 30.00 36.00		
Mic Gain(dB)	Gain(dB) 0.0 Freq. 20 QFactor 0.00	0.0 20 0.00
	Filter Type Peaking Low St Hinh St	2 Peaking A leff Low Shelf - Hinh Shelf -

Figure 9: Microphone EQ Filter Settings and Mic Gain Settings Tab.

When tuning is done, be sure to save the tuning parameters before clicking "Exit".

Click on the "Save" button and a window will pop up, prompting the user to save the work so far. Type in a name (with no space in between, only alphanumerics). In our example, we use: CX20985_Tune1, and click save.

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Recent Places		Name		Date modified	Size	Туре	-
Downloads		퉬 Freeman Config Tool		9/28/2016 12:02 PM		File folder	
- Onebrive		퉬 ConfigTool_Archive		9/28/2016 12:02 PM		File folder	
🚞 Libraries	Ξ	퉬 Freeman DRC email		9/26/2016 4:25 PM		File folder	
Documents		퉬 spec		9/26/2016 10:07 AM		File folder	1
Music		퉬 Freeman Spec		9/26/2016 9:51 AM		File folder	
Pictures		FREEMAN_B0_Patch_18-00-00		9/20/2016 6:01 PM		File folder	
Videos		퉬 Block Diagram		9/20/2016 9:42 AM		File folder	
		퉬 Vilano info		9/14/2016 6:19 PM		File folder	
🖳 Computer		January MRD		9/14/2016 6:15 PM		File folder	
Local Disk (C:)		FREEMAN_B0_Patch_10-00-00		7/21/2016 3:53 PM		File folder	
	Ŧ	< [III				•
File name: 🔽	X2098	35_Tune1					•
Save as type: P1	TF File	e (*.ptf)					-
Hide Folders				(Save	Cancel	

Figure 10: Saving Tuning Parameters and saving the new firmware.

The windows will disappear after saving and there will be three files generated, namely:

CX20985_Tune1.asm

CX20985_Tune1.pcf

CX20985_Tune1.ptf

Click "Exit" to exit the 'AudioCfgTool.exe'

After exiting the 'AudioCfgTool.exe', use the Conexant provided: UpgradeFirmware-1.0.55.0.exe tool to load the newly generated firmware: 'CX20985_Tune1.ptf'. Upon completions, power cycle the CX2098x device, and upon power-up, the Cx2098x device will have the new tuning parameters.

If further tuning is desired, repeat the above tuning procedure and give the new tuning parameters a new file name, say, CX20985_Tune2 etc.

When you are satisfied with your tuning results, please provide the .asm, .ptf and the .pcf files to Conexant, and we will build you an official firmware release for your production needs.

Conclusion

This concludes this User Guide. We welcome your feedback, corrections, recommendations. Please contact your Conexant field applications engineer for further support.

Thank you!